

Patent
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IN THE CLAIMS:

Please amend Claim 21 as shown.

1-20. (Canceled)

21. (Currently Amended) A power semiconductor device comprising:
a substrate of a first or second conductivity type;
a voltage sustaining region disposed on said substrate, said voltage sustaining region including:
an epitaxial layer having a first conductivity type;
at least one trench located in said epitaxial layer;
at least one doped column having a dopant of a second conductivity type, said column being formed from a dopant introduced into both sidewalls and bottom surfaces of the trench by an etchant gas used to form the trench, said dopant being and which is diffused into the epitaxial layer;
a filler material substantially filling said trench; and
at least one region of said second conductivity disposed over said voltage sustaining region to define a junction therebetween.

22. (Original) The device of claim 21 wherein said at least one region further includes:
a gate dielectric and a gate conductor disposed above said gate dielectric;
first and second body regions located in the epitaxial layer to define a drift region therebetween, said body regions having a second conductivity type; and
first and second source regions of the first conductivity type located in the first and second body regions, respectively.

23. (Original) The device of claim 21 wherein said material filling the trench is undoped polysilicon.

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24. (Original) The device of claim 21 wherein said material filling the trench is a dielectric material.
25. (Original) The device of claim 24 wherein said dielectric material is silicon dioxide.
26. (Original) The device of claim 24 wherein said dielectric material is silicon nitride.
27. (Original) The device of claim 21 wherein said dopant is boron.
28. (Original) The device of claim 27 wherein said etchant gas is BCl_3 .
29. (Original) The device of claim 21 wherein said dopant is phosphorus.
30. (Original) The device of claim 29 wherein said etchant gas is PH_3 .
31. (Original) The device of claim 22 wherein said body regions include deep body regions.
32. (Original) The device of claim 21 wherein said power semiconductor device is selected from the group consisting of a vertical DMOS, V-groove DMOS, and a trench DMOS MOSFET, an IGBT, and a bipolar transistor.